

# POPULAR Computing WEEKLY

24 June 1982 Vol 1 No 10

30p

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on ZX81**

**Reviews:  
ZX81 assembler**

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## Editorial

With the advent of the Sinclair ZX Spectrum and the new range of Commodore Vics, there is a growing market for second-hand microcomputers.

Budding programmers, who learnt their skills on the ZX80/B1, are now looking for more advanced machines. Consequently, they are also looking to trade-in their old machines.

The era of the used micro is now upon us.

No one is quite sure, yet, what effects the second-hand market will have on microcomputer users and manufacturers. But some trends are already becoming apparent.

It is now possible for a first-time user to buy a second-hand 1K Sinclair ZX81 for around £80. This puts microcomputers within range of more people than ever before.

Present ZX81 owners will also find it easier to buy more expensive machines, using the money gained from selling their existing ZX81s.

There are pitfalls in buying second-hand micros, just as there are in buying second-hand cars. But, if you take reasonable care to ensure that the micro is in good working order, you could get yourself a bargain.

## Next Week



It's an android world and you must master the art of robot control — another game to test your wits

# Classified

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Z801 16K, one month old plus two tapes, £30. Tel: Cannock 725787.

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VIC-16 COMPUTER CASSETTE, auto BASIC, intro, basic books, covers, software, all new, £17.50. Tel: 01-403 2093.

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**BBC SOFTWARE CASSETTE No. 1.** Lone Ranger and Attack, £5. Cassette No. 2: Adventures, £5. Both by K. P. Hammonds, 5 Roxborough Road, Dorking, Surrey, RH4 1LJ.

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# Acorn quells fears over BBC delivery

ACORN have confirmed their commitment to fulfil orders for the BBC Model B by mid-August.

However, orders from as long ago as November 1981 still remain unfilled.

An Acorn spokesman explained that a "very large number" of the B models were shortly to be produced.

He said that the delivery dates being given to would-be owners by **III**, Marketing were

unduly pessimistic, being based on "current production figures".

To ease the difficulties, some Model As are being converted to Model Bs.

However, the main Model A manufacturer, Clestron Electronics, has now been sold to the AB Electronic Products Group.

The purchase, for an estimated £20,000, ends a period of uncertainty for Clestron, formerly in receivership.



The BBC's much-awaited model

Henry Kroch, AB's chairman, said: "Production of the machine will continue and benefit from the takeover."

AB Products Group, founded in 1935, had a turnover of over £2m in 1981.

John Radcliffe, of BBC Continuing Education, said the Corporation was "delighted that a firm financial base had been found for the Clestron operation".

## Fewer make a show of it

Despite being more than twice the size of last year's show, only 8,000 visitors attended the 3rd International Commodore Computer Show (June 3-5).

Those who came, 3,300 less than in 1981, saw the largest single-manufacturer show yet staged in the UK.

A Commodore spokesman said: "Despite the mounting heat, in commercial terms, the show was a resounding success."

The outstanding feature — apart from the first UK appearance of the Vic-20 — was the large number of exhibitors displaying Vic-20 software.

Jack Tammie, Commodore's Chief Executive, praised British companies. He said: "The show reaffirms my belief that the UK leads the world in micro software expertise."

## ZX82 back in full production

Manufacture of the Spectrum has now been restarted, following the production set-back reported in last week's issue.

The first production batch, which was returned to Tinsley, has been modified and was dispatched from Dursley on June 8.

The exact size of the delivery is not clear, but estimates suggest "several thousand" units are now on their way to buyers.



Vic-20 software proved to be the big hit of the show.

## Commodore hijacks Spectrum to America

Robin Bradbeer, co-editor of the Sinclair Spectrum manual and one-time education consultant at Commodore, has lent his Spectrum to America without his permission.

The theft happened at the Commodore Show. Bradbeer said: "People were interested in seeing the Spectrum so I took mine to show them."

"I took it in on Friday and Kit Spencer (Vice-President, Commodore Marketing) asked if he could borrow it overnight. I reluctantly said

OK and arranged to get it back from him at the show at 11.30 on Saturday.

"I waited around but he never turned up. At 9 o'clock he told me that Kit had got the 11 o'clock flight back to the States."

Bradbeer is considerably embarrassed by the proceedings and is "very, very angry".

He said: "I just walked out with a Vic and a colour tv from the exhibition and I said 'I'm taking these [if] you give me my Spectrum back'."

## Ad leaflet ejected

Leaflets advertising the Sinclair Spectrum were unceremoniously ordered out of the Commodore show in London on June 3.

The leaflets were an insert into Micro Forecast, the free

long-distance computer newspaper.

An organiser told the company that if they didn't take the leaflets out of the newspaper he would shut the stand down in 15 minutes.

## Sinclair aims for the main stream

Sinclair Research is to produce a new up-market machine.

The model, as yet unnamed, is to be aimed at the mainstream business user.

It will incorporate the new SCL flat-screen terminal, full colour and extra memory. The machine uses Sinclair basic and single-key word entry.

Development of the machine is well advanced and pre-production machines are on trial with certain business users for evaluation.

The new machine will sell for less than £350.

## A machine that speaks

Wideband Products has just launched a new speech synthesizer.

The unit connects in the micron through an 8-bit parallel port and can be used with most machines including the BBC and PET.

Unlike some types of synthesizers, the Wideband model does not have a particular dictionary of words that it can generate but, instead is capable of being instructed to say anything. This is because the machine is programmed to recognise phonetic groups rather than whole words.

Each word is fed in as a series of sound groups. In the basic model it is necessary to key in code numbers associated with the various sounds, and a dictionary is supplied listing the phonetic groups and their codes.

A software package is also available which enables the synthesizer to recognise the phonetic letter-groups directly.

Wideband is currently working on an advanced application for the Anglia Water Authority. The speech synthesizer is incorporated in a unit which will be placed on a river bank. Sensors in the water monitor conditions, such as pollution level or water height.

The basic model is £69 and the additional software pack is £10 (both exclusive of VAT).

# Chrisalid -

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# Club Reports

## Watching and waiting in Manchester

**David Kelly** reports on the first ZX fair to take place outside London

Summer may be said to be smiling on Britain now but at traditionally wet Manchester the arrival of the sun cast a shadow over the ZX Microfair.

It was the first such event to be staged outside London. The weather was dazzling and the people stayed away in droves.

As with the last London show, the fair — at the New Century Hall May 29-30 — was spread over two days. There were more than 50 exhibitors and plenty to see, so why was the attendance down to less than 2,000 for the two days? And why was it that many of the exhibitors commented on the slowness in sales?

Mike Johnston, the ZX Microfair organiser was able to pin-point several possible reasons.

The most noticeable feature of the show, he said, was the influence of the Spectrum launch, both on the visitors and the exhibitors.

He was quite pleased with the turn-out, particularly on the Saturday, but the uncertainty generated following the Spectrum launch resulted in fewer purchases.

Mike felt the attendance was about right, since the New Century Hall had been chosen to accommodate the sort in numbers that turned up.

When he had been setting up the show in January, he had wanted to include as many local companies as possible. In the event, about one third of the stands represented firms operating in the region.

Rumours of a ZX81 price reduction and uncertainty in the Spectrum delivery dates left most people a little bewildered.

Few exhibitors could be sure of their plans while the Spectrum remained undelivered and the same applied to the buyers.

Mike Johnston is very much aware of the situation. He is going ahead with his next London show, at the New Horticultural Hall in August, but will delay the next regional show, planned probably for Bristol or Southampton, until after the Spectrum is established.

He believes the current mood of despondency cannot last: "People said just the same when the ZX81 was launched — and now look at the number of add-ons and products available for it. Exactly the



Moving in for a closer look... some of the visitors at the Manchester show



And, at times, jostling for position

same will be true of the Spectrum in a couple of months time."

Of the Manchester show, Mike says: "It seems that anything less than the fantastic success we had in the first London show is regarded as a disaster!"

He did not believe that the response in Manchester would alter his plans for future ZX fairs.

The idea of the fairs has always been to put companies and ZX owners together — and to do so as cheaply as possible. It has been important to keep the entrance fee as low as possible — 60p for adults — and to minimise the expenses to exhibitors.

The cost of a stand at Manchester — £25 — was deliberately kept down to

encourage small businesses which are just beginning to trade.

The next London Show, at the New Horticultural Hall, will be for one day only and in a much bigger venue. The hall has 20,000 sq ft of space, all in one area, so there will be plenty of room for stands and visitors!

Again the show will favour the smaller trader, who will benefit from the lower cost of a one-day event.

Mike hopes that this will result in a show with much interest and variety, but it will be interesting to see what the response from the various ZX businesses will be. Many traders at Manchester had been very disappointed with the attendance and their sales.

The New Horticultural Hall ZX Microfair will be held on Saturday August 8.

For further details contact Mike Johnston, 71 Park Lane, Tottenham, London N17.

## What's happening

**Manchester Acorn User Group** meets fortnightly (during school term time only) on Tuesdays at 7 pm in the Abraham Moss Centre, Cheadle. The next meeting will be on June 22. Either telephone (daytime) Barry Pickles on 051-634 1234 or (evening) John Ashurst on 051-681 4962 or write to Barry Pickles, 1 Cromhall Walk, Manchester M8.

**North London BBC Micro Users Group** is being formed. It is hoped that the group will hold fortnightly meetings once a suitable venue has been found. All interested parties and potential members should get in touch with Jeremy San, 111 Uphill Road, Mill Hill, London NW8. (Tel: 01-998 0114).

**Crawley ZX81 Users Club** meets every Monday, nearly all the year round (including school holidays) in the Science Laboratory, Ifield School, Lady Margaret Road, Ifield, Crawley, Sussex. The club meets between 7 pm and 9 pm. Membership is £5 per year and the first meeting is free. Contact John Hyatt, Club Secretary, 23 Peilweth Court, Bewbush, Crawley, Sussex. (Tel: 0293 513396).

**Southern Gas Micro Club** is open to any employee of Southern Gas. The club meets at the Southern Gas RHQ, 80 St Mary's Road, Southampton, and has access to ZX81s, a Vic-20, an Acorn Atom and BBC machines. In addition the club produces Microsem, a newsletter containing club news, reviews and programming hints and articles. Contact Ian Smith, Floor A1, Management Services, Southern Gas RHQ, 80 St Mary's Road, Southampton.



A new game for the 16K ZX81  
by Dave McGuire

```
10 REM XXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
20 LET R=16514
30 INPUT B
40 POKE R,B
50 PRINT B,"-"
60 GOTO 30
65 LET S=0
70 LET R=R+1
75 IF R>163971 THEN R=PEEK 16396+256+PEEK
163971+768 R=16396+256+PEEK
80 POKE R,S
85 POKE R,R+1
90 POKE R,R+2
95 POKE R,R+3
100 FOR Q=0 TO B
110 POKE R,R+Q,157
120 NEXT Q
130 POKE R,16517,186
140 POKE R,16518,186
150 POKE R,16519,186
160 PRINT AT 21,0;"SCORE -"
170 PRINT AT 21,5,-
180 PRINT AT 21,0,3
190 LET S=1
200 LET T=0
210 LET T=1
220 IF S>0 THEN GOTO 520
230 IF INKEY$="" THEN GOTO 320
240 LET D=D-1
250 LET T=VAL INKEY$ 
260 LET M=(T-3)*10/2
270 POKE R,M
280 FOR V=16 TO 1 STEP -1
290 IF (RND4+1)=3 THEN LET M=M-1
300 PRINT AT U+1,16396 M-1+16390
310 PRINT AT U,M,"1"
320 PURGE 16394,2
330 POKE R,16519
340 LET X=X+(P=0)+(X=1)-(X=27)-
(P=1)
350 LET P=P-(X=2)+IX=261
370 LET V=156
380 IF P=0 THEN LET V=206
390 POKE 16517,V
400 IF T=0 THEN GOTO 220
410 NEW V
420 INT V=16517,V;" "
430 IF PEAK (16517,P)=3 THEN GOTO 210
440 POKE 16517,226
450 FOR Z=1 TO 16289+X STEP 33
460 POKE 16518,INT(Z/256)
470 POKE 16519,16564+PEEK 16518
480 RAND USA 16519
490 NEXT Z
500 LET S=S+1000
510 CLS
520 IF S=0 THEN GOTO 50
530 LET C=5/1000
540 IF C<1 THEN PRINT TAB 3,"YOU KILLED 2 SHARK FOR"
550 IF C>1 THEN PRINT TAB 3,"YOU KILLED 100 SHARKS FOR"
560 PRINT TAB 3,C," POINTS"
570 IF C>0 THEN LET DS="THE BLACK THING"
580 IF C=0 THEN LET DS="SHARK"
590 IF C<1 THEN LET DS="SHARK S"
600 IF C>1 THEN LET DS="SHARKS"
610 IF C>2 THEN LET DS="TWO SHARKS"
620 IF C>3 THEN LET DS="NOT SHARK"
630 IF C>5 THEN LET DS="IF I HAD EMOTIONS I WOULD BE MILDLY IM-PESSED"
640 IF C>7 THEN LET DS="COULD I MEMO WRITE A LITTLE YOUR FEET"
650 IF C>9 THEN LET DS="POSSIBLY OR I PREPARED"
660 IF C>11 THEN LET DS="HAVE HORNY ON THEM...BEEN"
670 IF C>13 THEN LET DS="SHARK IS ONE AN ENDANGERED SPECIES"
680 IF C>15 THEN LET DS="HORNY YOU MADE ANY FACTS WITH HORNS & SINGS LATELY? TALK"
690 PRINT AT 10,10;"SHARKING"
700 PRINT
710 PRINT DS
```



# Reviews

## hardware



Box of noise... Telesound 82

### Telesound 82

COMPUSOUND, 32 Langley Close,  
Redditch, Worcestershire B98 0ET.  
Tel: 0725-21439.  
Price £9.95 including VAT.

This small metal box sticks on to the back of a ZX81 and enables you to put sounds through your TV speaker. It is connected to the ZX81 by three crocodile clips covered in insulated sleeves, so it can be removed at any time without damaging your ZX81. There is no soldering to be done and no holes to be made in the case.

Once the clips are fitted to the ZX81, the unit may be tested. The audio input to the Telesound 82 is via a 3.5mm jack plug fitted to nine inches of cable. It may be plugged into the output of a tape recorder, soundboard or even the MIC socket of the ZX81.

If you have no sound source then a test program is provided so that the unit can be adjusted with the ZX81 providing the sounds. A program is also included to turn the ZX81 into an electronic organ using the lower two rows of the keyboard.

Telesound 82 will produce sounds through the loudspeaker of a TV set whether or not a program is running. It will also work in FAST or SLOW modes. This can be used to advantage, as a tape giving instructions can be played through the TV, even before the program has been started.

The unit only draws a small current and should not cause any overheating problems with a Sinclair power pack. It does not require any RAM memory to operate and can be used on a 1K or 16K machine.

There were only two problems that I found with Telesound 82. First, the red and black connecting wires were a bit short. If you have one of the larger RAM packs that run along the back of the ZX81, then it could get in the way. Longer leads would

have allowed it to be mounted on the side or the top of the ZX81.

The other problem related to a keyboard beeper that I have fitted to my ZX81. It also uses the TV Sync signal and the Telesound made this impossible. I cured this by inserting a 49 ohm resistor in series with the green crocodile clip, allowing both units to work quite happily together.

The unit works best with the sound source volume control on full. Using the TV's volume control to adjust the sound level keeps the background noise down.

#### Conclusion

This unit makes games and educational uses of the ZX81 much more interesting. A separate amplifier is no longer necessary, as the TV's sound channel replaces it. The instructions are clear and easy to follow.

The two programs included with the kit are a FAST mode electronic organ routine and a short test program. Telesound 82 is excellent value for money and, I believe, the only one on the market. SA

### RD system

RD Laboratories, 5 Kennedy Road, Dane End, Ware, Hertfordshire SG12 0LU. Tel: 0920 84380. Prices: RD8100 £40; RD8101 £15, RD8110 £27.50.

The simplest RD system consists of an RD8101 micro-computer and an RD8110 eight bit input/output port. The motherboard is different from most in that it consists of 0.1mm spaced pins which stick up from the motherboard in two parallel rows. There is space for two modules on the RD8101, one on each row of pins.

If more modules are required, RD make the RD8100 which is an eight row motherboard in a case. This large motherboard has several advantages over the simple printed circuit board of the micro-computer. It is contained in a black plastic box, sloped towards you, and is fully buffered which means that there are chips built into the box to amplify the signals coming from the ZX80 or ZX81. This buffering allows the modules attached to the motherboard to be removed at any time without crashing the ZX computer.

The 16K RAM pack and printer can be connected to the back of either motherboard, so that any modules that you wish to use can also be connected here. An extra power supply for the motherboard can be plugged in to a power socket at the back, to relieve the strain on the ZX81's own 5 volt regulator.

The RD8110 provides eight input wires and eight output wires of a memory mapped port which can be used in a variety of

ways. This port is one of the few that is fully decoded, so that it occupies one address and can be treated like a piece of RAM.

The address of the port can be set to one of 16 addresses between 16552 and 15587 by inserting a wire in a five pin socket on the underside of the module. The connections to the port can be made in two ways, by poking bare wire into the sockets on top of the module or by plugging in easily available 0.1mm Molex pinned blocks. No soldering is required.

The booklet that accompanies each part of the system explains what you can do with the port, from using a 64 key keyboard to a remote testing facility.

The RD8100 is, I believe, a very good system for the experimenter or for school. You can add as many modules as you require and it does not take an electronics genius to use them. SA

### Info and Data

By Barbara and John Jaworski, published by Nelson, 200 pages, paperback. Price £3.95.

Every user of a home computer comes to the time when he or she wants to learn more about computers. When the games pall or the struggles at unstructured programming cease, relax in a chair with this excellent background book.

Computers, Information and Data was written specifically for school and college use, but do not let that put you off. For one thing, test-books are a good starting point for picking up a basic knowledge of almost any field. Also, this book is the best CSE Ordinary level computing text-book that I have come across. It is certainly tougher going than some, and has less pictures, but it covers the material carefully and thoroughly.

One point to note is that this book does not include material on programming. This is normal educational practice — different people have different approaches to programming and different machines to program. For similar reasons the authors do not cover the history, logic and social impact of computers.

There are chapters on the nature of the digital machine, data, storage, files, hardware, software, systems analysis, programming approaches, processing and applications. The book has plenty of examples and exercises, and the index is excellent.

In every way this is a most useful book whether you are interested in computers for personal or educational reasons. And it comes at a school-book price — good value in other words. KA

# Reviews

## software

### ZXAS

Bug-Byte Software, 96-100 The Albany, Old Hall Street, Liverpool L2 3BX  
ZX81 16K cassette  
Price £3.00

ZXAS is an assembler for the 16K ZX81, which is written in machine code. The program is 5K long and when run relocates itself in the top five k of RAM and reduces RAMTOP by five k. A small BASIC portion of the program inputs the start location of the machine code and calls the assembler.

Standard Zilog mnemonics are used, with the exception of commas which are replaced by full stops. If the operations are separated by semicolons, more than one can be placed in the REM statements which hold the object code. However, this can make debugging a bit harder.

Two hundred and fifty-six labels are allowed, imaginatively called L0 to L255. These are distinguished by placing a colon before them. The assembler is hex-pass and values using labels are calculated on the second pass.

The assembler works extremely quickly assembling 20 instructions as the screen is displayed, which takes less than one second. The operation codes and locations in hex are displayed, along with the mnemonics and the codes original REM statement.

The program seems bug-free and only has one major fault. This is the lack of a routine to save assembled code on to tape unless the code is first put in a REM statement.

The program loads well in about two and a half minutes. But the costing on my copy was slightly distorted, so it has to be pressed firmly into the recorder. This could cause some tape problems, but the tape itself sounds OK.

#### Summary

A well-thought-out product, which is useful to anyone who is seriously interested in machine-code programming on the ZX81.

AE

### Fun To Learn

Available from W H Smith branches, or direct from Sinclair Research, Freepost Camberley Surrey GU18 3BR.  
ZX81 16K cassette.  
Price £6.95

If you go into your local W H Smith, you will see the same brown and yellow stripes of the ICL 'Fun To Learn' series of software. There are 6 of these tapes, and

they form a large part of Sinclair's latest releases of software for the ZX81. The tapes are:

- E1 English Literature 1 and 2
- E2 Geography
- E3 History
- E4 Mathematics
- E5 Music
- E7 Inventors
- E8 Science

Most of these programs take the form of a race between 1 to 4 people, with a menu of about half a dozen categories within the main subject. For instance, the history program will give you the choice of answering questions on among others.

Moments of British History, The Reign and Rule of Queen Victoria, etc. These are then set with multiple-choice answers. There is also a teaching module on some subjects in which the computer runs through seven pages of the subject with dates and various other informative notes.

The Geography program is designed for one person only and displays a map of England or Europe. This user then answers questions about the towns of England, or the counties and capitals of Europe. The computer will also run through the locations of these on the maps, in the resulting mode.

Mathematics consists of four levels in each of the four basic operations of addition, subtraction, multiplication and division.

Spelling is a test for 6- to 11-year-olds. Sentences are spoken, and words within that sentence tested. The correct spelling will then appear, and the user goes on to the next sentence.

#### Summary

Attractively boxed and easily loaded, the programs are, however, slightly overpriced. Many of the programs share the same basic algorithm. Even though expert knowledge must have been sought to set the questions, the duplication of programs should have brought the price down by a pound or two.

The questions are fairly difficult, and would probably appeal more to older teenagers and adults when used as a General Knowledge Quiz rather than in a strict classroom environment.

It must be admitted, however, that younger children recognise even the harder questions as they come round for the fourth or fifth time. Unfortunately there is no textbook to refer back to and gain further knowledge. Having learnt that disc drives were invented in 1962, but were not in general use until 1966, it would be nice to know why.

Spelling mistakes occur occasionally, but are probably due to careless typing. There are one or two more serious mistakes, such as Sir Arthur Bliss's inclusion

in the section on Opera, when Bliss did not write any Operas.

ICL's next addition to their educational range should be a Modular program that would enable the users to set their own questions — there being only a limited amount of data in existing programs.

AB

### A-mazing Vic Pack

Audiotech Ltd, PO Box 88, 34-36 Crown Street, Reading, RG1 2DR cassette  
Price £6.95 (including VAT).

A-mazing is yet another version of the Pac-Man arcade game. The Gobbler wanders around a maze, side-stepping unfriendly ghosts and eating lots of little dots. Once where I put them in hard to discover — it is obviously one of those voracious creatures that can eat its own weight several times over.

In the US the original Alair arcade version coined over \$1 billion in its first year. But, on the strength of this Audiotech version 4 is hard to say why.

The major disadvantage of A-mazing is that it soon becomes a walkover. When the programme first runs, everywhere is fine. After a short while, however, the Gobbler becomes rather easy-to-trap, particularly when using the joystick option.

Another problem is that the ghosts do not seem that unfriendly. They prefer to laze in somewhat dead and are not terribly bothered by the ravenous Gobbler. You can quite happily sneak up behind a ghost and chomp the blob there, secure in the knowledge that the ghost will take some time to turn round.

The game does, however, contain all the features of the original. If you are unlucky enough to be cornered by a ghost, you have no hope and must forfeit one of your three lives.

But, you can run the tables on the ghosts by eating one of the four power dots in the maze. This sounds a tone and causes the ghosts to change colour. It is then possible to eat the ghosts, until the power runs out and the ghosts revert to their normal colours.

The more blobs you eat, the more points you are awarded, with bonuses for swallowing power dots or ghosts.

Basic instructions and the key-board controls are explained on the insert supplied with the cassette.

#### Summary

The Vic-Pack version is a little short of A-mazing, but it will undoubtedly appeal to Pac-Man enthusiasts.

DK



# Open Forum

from previous page

Finds the position of the most significant bit while the second loop works out the remaining least significant bits.

## Big letters

on Vic-20

The program scrolls a message of the user's choice up the screen in large 8x8 letters. Here's how it works:

Lines 0 to 4 print the message.  
Lines 5 to 7 copy the message, omitting the top of the screen and set up the variables.  
Line 8 puts the screen codes of the message into an array and sets the print position to the centre of the screen.  
Lines 9 to 12 PEEK the character generator, convert the number to binary and then to a series of inverse spaces which make up the characters.

100 A\$ = "LEARNING ZERO ARE NOT DISPLAYED"  
110 FOR I = 1 TO 100

120 PRINT#1:A\$;I:CLOSE#1:PRINT#1;"

130 IF I <= 10 THEN 100

140 PRINT#1;"

150 FOR I = 100 TO 1000

160 PRINT#1;" ";:NEXT I

170 PRINT#1;" ";:NEXT I

180 PRINT#1;" ";:NEXT I

190 PRINT#1;" ";:NEXT I

200 PRINT#1;" ";:NEXT I

210 PRINT#1;" ";:NEXT I

220 PRINT#1;" ";:NEXT I

230 PRINT#1;" ";:NEXT I

240 PRINT#1;" ";:NEXT I

250 PRINT#1;" ";:NEXT I

260 PRINT#1;" ";:NEXT I

270 PRINT#1;" ";:NEXT I

280 PRINT#1;" ";:NEXT I

290 PRINT#1;" ";:NEXT I

300 PRINT#1;" ";:NEXT I

310 PRINT#1;" ";:NEXT I

320 PRINT#1;" ";:NEXT I

330 PRINT#1;" ";:NEXT I

340 PRINT#1;" ";:NEXT I

350 PRINT#1;" ";:NEXT I

360 PRINT#1;" ";:NEXT I

370 PRINT#1;" ";:NEXT I

380 PRINT#1;" ";:NEXT I

390 PRINT#1;" ";:NEXT I

400 PRINT#1;" ";:NEXT I

410 PRINT#1;" ";:NEXT I

420 PRINT#1;" ";:NEXT I

430 PRINT#1;" ";:NEXT I

440 PRINT#1;" ";:NEXT I

450 PRINT#1;" ";:NEXT I

460 PRINT#1;" ";:NEXT I

470 PRINT#1;" ";:NEXT I

480 PRINT#1;" ";:NEXT I

490 PRINT#1;" ";:NEXT I

500 PRINT#1;" ";:NEXT I

510 PRINT#1;" ";:NEXT I

520 PRINT#1;" ";:NEXT I

530 PRINT#1;" ";:NEXT I

540 PRINT#1;" ";:NEXT I

550 PRINT#1;" ";:NEXT I

560 PRINT#1;" ";:NEXT I

570 PRINT#1;" ";:NEXT I

580 PRINT#1;" ";:NEXT I

590 PRINT#1;" ";:NEXT I

600 PRINT#1;" ";:NEXT I

610 PRINT#1;" ";:NEXT I

620 PRINT#1;" ";:NEXT I

630 PRINT#1;" ";:NEXT I

640 PRINT#1;" ";:NEXT I

650 PRINT#1;" ";:NEXT I

660 PRINT#1;" ";:NEXT I

670 PRINT#1;" ";:NEXT I

680 PRINT#1;" ";:NEXT I

690 PRINT#1;" ";:NEXT I

700 PRINT#1;" ";:NEXT I

710 PRINT#1;" ";:NEXT I

720 PRINT#1;" ";:NEXT I

730 PRINT#1;" ";:NEXT I

740 PRINT#1;" ";:NEXT I

750 PRINT#1;" ";:NEXT I

760 PRINT#1;" ";:NEXT I

770 PRINT#1;" ";:NEXT I

780 PRINT#1;" ";:NEXT I

790 PRINT#1;" ";:NEXT I

800 PRINT#1;" ";:NEXT I

810 PRINT#1;" ";:NEXT I

820 PRINT#1;" ";:NEXT I

830 PRINT#1;" ";:NEXT I

840 PRINT#1;" ";:NEXT I

850 PRINT#1;" ";:NEXT I

860 PRINT#1;" ";:NEXT I

870 PRINT#1;" ";:NEXT I

880 PRINT#1;" ";:NEXT I

890 PRINT#1;" ";:NEXT I

900 PRINT#1;" ";:NEXT I

910 PRINT#1;" ";:NEXT I

920 PRINT#1;" ";:NEXT I

930 PRINT#1;" ";:NEXT I

940 PRINT#1;" ";:NEXT I

950 PRINT#1;" ";:NEXT I

960 PRINT#1;" ";:NEXT I

970 PRINT#1;" ";:NEXT I

980 PRINT#1;" ";:NEXT I

990 PRINT#1;" ";:NEXT I

1000 PRINT#1;" ";:NEXT I

1010 PRINT#1;" ";:NEXT I

1020 PRINT#1;" ";:NEXT I

1030 PRINT#1;" ";:NEXT I

1040 PRINT#1;" ";:NEXT I

1050 PRINT#1;" ";:NEXT I

1060 PRINT#1;" ";:NEXT I

1070 PRINT#1;" ";:NEXT I

1080 PRINT#1;" ";:NEXT I

1090 PRINT#1;" ";:NEXT I

1100 PRINT#1;" ";:NEXT I

1110 PRINT#1;" ";:NEXT I

1120 PRINT#1;" ";:NEXT I

1130 PRINT#1;" ";:NEXT I

1140 PRINT#1;" ";:NEXT I

1150 PRINT#1;" ";:NEXT I

1160 PRINT#1;" ";:NEXT I

1170 PRINT#1;" ";:NEXT I

1180 PRINT#1;" ";:NEXT I

1190 PRINT#1;" ";:NEXT I

1200 PRINT#1;" ";:NEXT I

1210 PRINT#1;" ";:NEXT I

1220 PRINT#1;" ";:NEXT I

1230 PRINT#1;" ";:NEXT I

1240 PRINT#1;" ";:NEXT I

1250 PRINT#1;" ";:NEXT I

1260 PRINT#1;" ";:NEXT I

1270 PRINT#1;" ";:NEXT I

1280 PRINT#1;" ";:NEXT I

1290 PRINT#1;" ";:NEXT I

1300 PRINT#1;" ";:NEXT I

1310 PRINT#1;" ";:NEXT I

1320 PRINT#1;" ";:NEXT I

1330 PRINT#1;" ";:NEXT I

1340 PRINT#1;" ";:NEXT I

1350 PRINT#1;" ";:NEXT I

1360 PRINT#1;" ";:NEXT I

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1400 PRINT#1;" ";:NEXT I

1410 PRINT#1;" ";:NEXT I

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1430 PRINT#1;" ";:NEXT I

1440 PRINT#1;" ";:NEXT I

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1480 PRINT#1;" ";:NEXT I

1490 PRINT#1;" ";:NEXT I

1500 PRINT#1;" ";:NEXT I

1510 PRINT#1;" ";:NEXT I

1520 PRINT#1;" ";:NEXT I

1530 PRINT#1;" ";:NEXT I

1540 PRINT#1;" ";:NEXT I

1550 PRINT#1;" ";:NEXT I

1560 PRINT#1;" ";:NEXT I

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1600 PRINT#1;" ";:NEXT I

1610 PRINT#1;" ";:NEXT I

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1790 PRINT#1;" ";:NEXT I

1800 PRINT#1;" ";:NEXT I

1810 PRINT#1;" ";:NEXT I

1820 PRINT#1;" ";:NEXT I

1830 PRINT#1;" ";:NEXT I

1840 PRINT#1;" ";:NEXT I

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1970 PRINT#1;" ";:NEXT I

1980 PRINT#1;" ";:NEXT I

1990 PRINT#1;" ";:NEXT I

2000 PRINT#1;" ";:NEXT I

2010 PRINT#1;" ";:NEXT I

2020 PRINT#1;" ";:NEXT I

2030 PRINT#1;" ";:NEXT I

2040 PRINT#1;" ";:NEXT I

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2070 PRINT#1;" ";:NEXT I

2080 PRINT#1;" ";:NEXT I

2090 PRINT#1;" ";:NEXT I

2100 PRINT#1;" ";:NEXT I

2110 PRINT#1;" ";:NEXT I

2120 PRINT#1;" ";:NEXT I

2130 PRINT#1;" ";:NEXT I

2140 PRINT#1;" ";:NEXT I

2150 PRINT#1;" ";:NEXT I

2160 PRINT#1;" ";:NEXT I

2170 PRINT#1;" ";:NEXT I

2180 PRINT#1;" ";:NEXT I

2190 PRINT#1;" ";:NEXT I

2200 PRINT#1;" ";:NEXT I

2210 PRINT#1;" ";:NEXT I

2220 PRINT#1;" ";:NEXT I

2230 PRINT#1;" ";:NEXT I

2240 PRINT#1;" ";:NEXT I

2250 PRINT#1;" ";:NEXT I

2260 PRINT#1;" ";:NEXT I

2270 PRINT#1;" ";:NEXT I

2280 PRINT#1;" ";:NEXT I

2290 PRINT#1;" ";:NEXT I

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2630 PRINT#1;" ";:NEXT I

2640 PRINT#1;" ";:NEXT I

2650 PRINT#1;" ";:NEXT I

2660 PRINT#1;" ";:NEXT I

2670 PRINT#1;" ";:NEXT I

2680 PRINT#1;" ";:NEXT I

# New ZX81 Software from Sinclair.

A whole new range of software for the Sinclair ZX81 Personal Computer is now available - direct from Sinclair. Produced by ICL and Psion, these really excellent cassettes cover games, education, and business/household management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the ZX 16K RAM pack (the description of each cassette makes it clear what hardware is required). The RAM pack provides 16-times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £4.95.

The Sinclair **III** Printer offer full alphanumeric and highly-sophisticated graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for permanent record. The ZX Printer plugs into the rear of your ZX81, and you can connect a RAM pack as well.

## Games

### Cassette G1: Super Programs 1 (ICL)

Hardware required - ZX81

Price - £4.95

Programs - Invasion from Jupiter

Skills - Magic Square, Doodle, Kim

Liquid Capacity

Description - Five games programs plus easy conversion between pints/gallons and litres.

### Cassette G2: Super Programs 2 (ICL)

Hardware required - ZX81

Price - £4.95

Programs - Rings around Saturn

Secret Code, Mindboggling Silhouette

Memory Test, Metric conversion

Description - Five games plus easy conversion between inches/feet/yards and centimetres/metres.

### Cassette G3: Super Programs 3 (ICL)

Hardware required - ZX81

Price - £4.95

Programs - Train Race, Challenge

Secret Message, Mind that Meteor

Character Doodle, Currency Conversion

Description - Five games plus currency conversion at will - for example dollars/pounds.

### Cassette G4: Super Programs 4 (ICL)

Hardware required - ZX81

Price - £4.95

Programs - Down Under, Submarines

Doodling with Graphics, The Invisible

Invader, Reaction Patrol

Description - Five games plus easy conversion between miles per gallon and European fuel consumption figures.

### Cassette G5: Super Programs 5 (ICL)

Hardware required - ZX81 + 16K RAM

Price - £4.95

Programs - Martian Knock Out

Graffiti, Find the Mate

Labyrinth, Drop & Bounce

Continental

Description - Five

games plus easy

conversion

between English and

continental dress sizes

### Cassette G6:

### Super Programs 6 (ICL)

Hardware required - ZX81 + 16K RAM

Price - £4.95

Programs - Galactis, Invasion, Journey

into Danger, Create Nine Hole Golf

Solitaire, Daylight Robbery

Description - Six games making full use

of the ZX81's moving graphics capability

### Cassette G7: Super Programs 7 (ICL)

Hardware required - ZX81

Price - £4.95

Programs - Race-track Chase, NIM

Tower of Hanoi, Docking the Spaceship

Golf

Description - Six games including the

fascinating Tower of Hanoi problem

### Cassette G8: Super Programs 8 (ICL)

Hardware required - ZX81 + 16K RAM

Price - £4.95

Programs - Star Trail (plus blank tape on

side 2)

Description - Can you, as Captain

Church of the UK spaceship Endeavour,

reach the galaxy? The Klingon menace?

### Cassette G9: BioRhythms (ICL)

Hardware required - ZX81 + 16K RAM

Price - £6.95

Programs - What are BioRhythms?

Your BioRhythms

Description - When will you be at your

peak (and trough) physically,

emotionally, and intellectually?

### Cassette G10: Backgammon (Psion)

Hardware required - ZX81 + 16K RAM

Price - £5.95

Programs - Backgammon, Dice

Description - A great program using fast and efficient machine code, with graphics board, rolling dice, and doubling dice. The dice program can be used for any dice game.

### Cassette G11: Chess (Psion)

Hardware required - ZX81 + 16K RAM

Price - £6.95

Programs - Chess, Chess Clock

Description - Fast, efficient machine code, a graphic display of the board and pieces, plus six levels of ability combine to make this one of the best chess programs available. The Chess Clock program can be used at any time.

### Cassette G12:

### Fantasy Games (Psion)

Hardware required - ZX81 or ZX80 with 8K BASIC ROM + 16K RAM

Price - £4.75

Programs - Pontious Swamp, Sorcerer's Island

Description - Pontious Swamp: rescue a beautiful princess from the evil wizard Sorcerer's Island; you're kidnapped. To escape, you'll probably need the help of the Grand Sorcerer!

### Cassette G13:

### Space Raiders and Bomber (Psion)

Hardware required - ZX81 + 16K RAM

Price - £3.95

Programs - Space Raiders, Bomber

Description - Space Raiders is the ZX81 version of the popular pub game: Bomber: destroy a city before you hit a sky scraper

### Cassette G14: Flight Simulation (Psion)

Hardware required - ZX81 + 16K RAM

Price - £5.95

Program - Flight Simulation (plus blank tape on side 2)

Description - Simulates a highly maneuverable light aircraft with full controls, instrumentation, a view through the cockpit window, and navigational aids. Happy landings!

## Education

### Cassette E1: Fun to Learn series - English Literature 1 (ICL)

Hardware required - ZX81 + 16K RAM

Price - £5.95

Programs - Novelists, Authors

Description - Who wrote Robinson Crusoe? Which novelist do you associate with Father Brown?

### Cassette E2: Fun to Learn series - English Literature 2 (ICL)

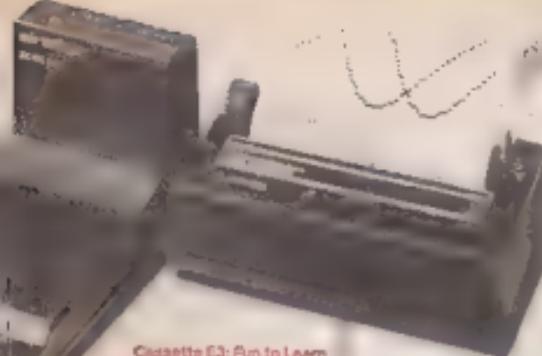
Hardware required - ZX81 + 16K RAM

Price - £6.95

Programs - Poets, Playwrights, Modern Authors

Description - Who wrote Song of the Shirt? Which playwright also played cricket for England?





Cassette E3: Fun to Learn  
series - Geography 1 (CD)

**Hardware required - ZX81 +  
512 RAM**

**Programs - Towns in England and  
Wales, Countries and Capitals of Europe**  
**Description -** The computer shows you  
a map and a list of towns. You locate  
the towns correctly. Or the computer  
challenges you to name a pinpointed  
location.

Cassette EA: Fun to Learn series  
History 1 (ICL)

**Hardware required - ZX81 + 16K RAM**  
**Price - £6.95**  
**Programs - Events in British History**  
**British Monarchs**  
**Description - From 1066 to 1981. Find**  
**out when important events occurred.**  
**Recognise monarchs in lots of identify**  
**cards.**

Cassattino ES: Run to Learn series - Mathematics 1 (ICL)

**Hardware required -** 200MHz+ ISK RAM  
**Price -** £6.95  
**Programs -** Addition/Subtraction  
Multiplication/Division.  
**Description -** Questions and answers  
on basic mathematics at different  
levels of difficulty.

### **Cassette B: Fun to Learn series - Book 1 (CD)**

Hardware required - ZX81 + 16K RAM  
Price - £6.95  
Programs - Composers Musicians  
Description - Which instrument does  
James Galway play? Who composed  
Polaris? etc.

Cassette E7: Fun to Learn series - Inventions 1 (CLL)

**Hardware required - ZX81 + 16K RAM**  
**Price - £6.95**  
**Programs - Inventions before 1850**  
**Inventions since 1850**  
**Description - Who invented television?**  
**What was the dangerous Lucifer?**

Cassette EB: Fun to Learn series –  
Spelling 1 (1CD)

**Hardware required - ZX81 + 16K RAM**  
**Price - £6.95.**  
**Programs - Series A1-A15 Series B1-B15**  
**Description - Listen to the word spoken**  
**on your tape recorder then spell it out**  
**on your ZX81. 300 words in total**  
**available for £11.95 extra.**

### **Business/household**

#### **BUSINESS/HOUSEHOLD**

**Hardware required - ZX81 + 16K RAM**

Program - Collector's Pack plus blank tape or side 2 for program/date/storage  
Description - This comprehensive program should allow collectors to stamp coins etc to hold up to 400 records & up to 8 different items on one cassette. Keep your records up to date and sorted into order.

### Cannville B12: The Club Record Contractor (HCL)

Hardware required - ZX81 + 16K RAM  
Price - £9.95  
Program - vb Record Controller plus  
blank tape on side 2 for program/data

**storage**  
Description : Enables clubs to hold records of up to 100 members on one cassette. Allows for names, addresses, phone numbers plus five lines of additional information - eg type of membership.

To: Sinclair Research FREEPOST Camberley Surrey GU16 3BA  
Please return via 1st class stamp. Thank you.

I enclose a cheque/postal order to Sender Research Limited.

Please cite: Hayes, T., & St. Gaudens, P. (2014). Politics and

Figure 3

Open Forum

pair of hex codes in suff-

```

1 READ DISKNAME
10 FOR X = 1 TO 16 NAME
20 INPUT A$;
30 IF X = 16 GOTO 29
40 SCROLL;
50 PODE X, NAME$ + A$, - 0006 AD2,- 17%
60 PRINT "A$";
70 INPUT A$;
80 END;

```

To see how the routine is used, delete lines 50 to 70 and add the following:

```

51 LET X = 16.14
52 PRINT#1 USR 3, 0: THIS IS AN EXAMPLE
      TAB USR 3, 0: THIS IS AN EXAMPLE
      SUBROUTINE: THIS IS A TEST
53 END#1 X = 16.14
54 END#1 X = 16.14
55 END#1 X = 16.14
56 END#1 X = 16.14
57 END#1 X = 16.14
58 END#1 X = 16.14
59 END#1 X = 16.14
60 GOTO 12

```

**Star Trek**  
on BBC More

It is a little known fact that the scripts of Star Trek were produced by Paramount's generators 16RDS values operating complete. I have replicated the original BBC Micro. Instead, it has proved possible to improve upon the original producing scripts of a higher quality than those filmed.

Of course, the program produces scripts of variable length. Pythagoras handles this by inserting 1000-and-a-half profile shots to pad out the episodes.

The program will run on either the Model A or B. Make sure that the strings in lines 130 and 505 are identical or the program will never end (that's how they got the *metron* option).

Note that the only DATA strings requiring quotes are those containing commas. Also note the spaces which prevent words being split by line feeds.

#### Partial screen clean

On Credit Streets

After writing a program to help with tax returns, I found I needed a program to clear parts of the Z80-1's display while leaving the ones showing the totals of each column intact.

The following machine code routine does the very quirky and needed only small changes to `main()` function as a very fast equivalent to the C `clrscr()`. This was considered necessary in the C3 command set, since time when the display and memory were slow. It also leaves characters unprinted just after the edge of the screen when `clrscr()` is run.

Rather than use the nest REM statement and call the routines by USR 16514, which I find violates the LOADING of some programs, it's desirable to make use of the \$XT\$T\$T\$ system variable. This is the BASIC loader program for the partial screen clear routine:

1942-1943 1943-1944  
1944-1945 1945-1946

The program can then be RUN and the decimal codes entered one at a time. It is viewed by **VIEWDATA**. This program codes 26 bytes, and works as explained in the right-hand column; the decimal codes in parentheses constitute each separator by a

CONTINUE  
40-14-10 100% REUSE Request is granted with the  
exception of 100% reuse.  
40-14-11 100% REUSE Request is granted.  
40-14-12 100% REUSE Request is granted with

## **PROGRAM OF THE WEEK**

**Address of PRIM7, location of FILE**  
 1700-1710, 8,404 Accumulator is loaded with value from  
 1800-1810, character from H.  
 1900-1910, 10,110 Accumulator is incremented by 110  
 2100-2110, 3,402 The first byte is read by I. Then next four bytes  
 2120-2130, 3,402 H, Register H is incremented by one  
 2140-2150, 1,403 A blank character is read with value in D.  
 2160-2170, 0,404 Accumulator is decremented by 9.  
 2180-2190, 3,402 H, Register H is incremented by two.  
 21A0-21B0, 3,402 H, Register H is decremented by two.  
 21C0-21D0, 1,403 H, Memory location addressed through H  
 is read with P-B.  
 21E0-21F0, 0,404 H, Register H is incremented by 1.  
 2200-2210, 4,406 The stack is 8 bytes.  
 2220-2230, 1,403 H, Register H is decremented by one.  
 2240-2250, 0,404 H, Register H is decremented by one.  
 2260-2270, 1,403 H, Register H is decremented by one.  
 2280-2290, 1,403 H, Register H is decremented by one.

This routine can now be called by GOSSUB 9900. Its effect will depend on the last PRINT statement executed. If it is like  
10 PRINT A1:A2:A3:  
11 END (or any other PRINT statement)  
then the screen will be cleared from line 10 down to the bottom corner of the screen. If the statement is  
10 PRINT A1:A2:A3:  
11 END

then the screen will be cleared from line 11, column 0 to the bottom of the screen. The effect of this will only be seen if the screen was already full, of course. Using this property of the last screen color the displayed type of display clearing can be obtained.

The second program was written to point out the slowness of the CLS function. It is 24 bytes long and can be entered using a separate program key to the one used previously (see PRINT A T D).

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```

142 FONDO STOPPABRUE
143 PROLIFERATION OF THE BRAIN
144 PRINTMESSAG
145 IF AT "Take use out of orbit" = 0 THEN END
146 PRINTMSG "You High Rate" THE END
147 END
148 DEF PROLBAY(X)
149 RESTORE X
150 READ MSGA
151 FOR I=1 TO NDO(M) READ MSGX(I)
152 ENDPROC
153 DATAINFO ,4,"I'm responsible for the waves in space
154 but not against but it is our ship's captain"
155 DATA Take use out of orbit; MSGX(1); Here's what makes
156 PROLBAY
157 DATA SPECIFI ,3,"It appears to be some kind of
158 ,4,"illegal
159 SED DATASECRET ,2,"The enigma is to take it.
160 SED DATAINFO ,1,"I'm sorry about that, but you can't do
161 SED DATAINFO ,1,"I'm sorry about that, but you can't do
162 SED DATAINFO ,1,"I'm sorry about that, but you can't do

```

## Star Trek by Jean Rabe

3000 euros, 25% a three  
at rates up. Pounds are 5.  
certainly emerged as a strong  
Europe's. She could take me

# Open Forum

## from previous page

3940 HOME 100  
2000 PRINT #1

The code to be entered is similar to that of the other routine but always assumes that the PRINT position is at line 0, hence the need for line 3900 to return line 0. The decimal codes for this program are as follows:

47 14 64 4 22 128 254 118 32 8 5 129 254 0

32 4 21 5 14 83 254 24 251

0000 0000 0000 0000 0000 0000

Change these to LEFT #FH-LINE#PrgmName\$... etc.  
ADD 1015 RETURN

This routine can now be called by GOSUB 3900 whenever a CLS command would previously be used in the main program. The screen clearing operation is far quicker than CLS is the display and memory are completely full.

If the program is very long there it may be advantageous to put this subroutine at the beginning of the main program by altering the line numbers and using a GOTO statement to jump over it to start the main program. This will save BASIC writing time searching through many line numbers until it finds the one referred to by the GOSUB. This is a point to bear in mind when writing any long program with many GOSUBs that refer to line numbers at the end of the main program. To put these subroutines at the beginning will help speed up program running time.

## Maze

on Vic-20

This program runs on a standard Vic and is a maze game where you compete against the clock. Movement is through the four function keys and full instructions are included in the program. Take care when typing in the program all cut spaces as lines as it adds to the layout of the screen.

## Hex-decimal converter

on Vic-20

This program is quite straightforward. The control is passed to one of two routines dependant upon the last character entered.

If the last character is 'h' the hex to decimal routine is called, otherwise the input is checked for a numeric value (line 190). The error message is displayed if the input does not meet these criteria, and the program returns to the start. The error message is also called if spaces are embedded in the string during the hex to decimal routine.

When using the STR\$ function a space is added to the front of the result (line 250)

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**Maze**  
by T. Walton

## **Open Forum**

from previous page

takes this space out so that the output looks neater. Lines 360 and 240 take care of the hex values A to F by converting them to decimal 10 to 15 and vice versa.

### **Sketch pad**

— 2 —

This sketch pad program enables you to draw your own pictures & diagrams. To start simply type in line 10 as:

12月18日星期一 2005年 300000

### Thin type

23-7044 A - M834 10 1855  
38 HFLU A  
43 HORE MA  
58 HERT H

and then RUN

Follow up by inputting these numbers in turn

42, 12, 64, 35, 22, 1, 30 1, 128, 6, 128,  
200, 79, 40, 3, 144, 24 1, 128, 119, 35, 20  
62, 33, 196, 32, 237, 35, 22, 1, 38, 62, 23,  
162, 200, 24, 223

After doing that delete lines 20 to 50 by typing in the rest of the program. SAVE all your work on to cassette before running.

The inverse-video function enables you to edit your pictures by changing to inverse and then filling in the white where the mistake was, then change back to normal video.

Maybe the National Gallery will accept some ZX masterpieces or have a special modern art display.

[www.vif-dechen.de](http://www.vif-dechen.de)

## Hex-decimal converter by Ken Clark

```

100 REM VIC-DECHENDER      3.5 VIC   131 CLAP 1302
110 PEH
120 PEH  CHANGES DECIMAL TO HEWITT INL + VICE VERSA
130 REM FOLLOWING INPUT WITH THE LETTER H
140 REM WITH NO INTERVENING SPACES EG. FFH
150 PEH  INPUT DECIMAL WITH ONE EXTRA CHARACTER
160 PEH
170 INPUT$?
180 IF PLEFT$=H THEN LLENKRY = GOTO120
190 IF ASC(LEFT$)=ASC(H)=57 THEN HIN
200 FFH# DEC TO HEWIT
210 PRINT HIN
220 Q=INT(HIN/16)
230 P#=-16#0
240 IF P#<=HIN&P#>=ASC(H)-57 THEN HIN
250 P#+=LEFT$(STR$,R+1)
260 HIN=HIN-P#
270 A=0:FFH=GOT0420
280 GOT0220
290 PRINT HIN" DECIMAL = "+$A+" HEWIT"
300 GOT0420
310 PEHIN HEWIT TO DEC ***
320 B$=LEFT$(STR$,L)
330 FOR I=0 TO L-1
340 T#=(B$(I)*16)+HIN(I)
350 IF ASC(T#)=52 THEN 420
360 IF ASC(T#)=44 THEN TWOC(T#)=52:GOTO 330
370 T#=T#-44
380 HIN=L-1:HIN(I)=T#
390 L=L-1:HIN(I)=T#
400 PRINT HIN" HEWIT = "+$A+" DECIMAL"
410 GOT0420
420 PRINT "INPUT ERROR TRY AGAIN"
430 WEND 100 101 102 103 104 105 106

```

```

10 REM ERNIE'S DRAWING PROGRAM
15 SUB 7,8=0:03 : STOP
16 DIM PI 3.14159
17 DIM GORTON JONES 5/4/1982
18 PRINT THE 100 SKETCH PAD
19 CLS
20
21 40 PRINT "THIS PROGRAM IS A
22 POWERFUL AID FOR DRAWING PICTURES
23 ON TO THE SCREEN OR PRINTER."
24 PRINT "THE SCREEN IS USED AS
25 A SKETCH PAD AND IS 64 BY 40
26 GOTO 10 10 IS IN THE BOTTOM LEFT
27
28 49 PRINT "THE X COORDINATE
29 IS A NUMBER OF SPACES ALONG THE
30 BOTTOM EDGE. THE Y COORDINATE
31 IS THE NUMBER UP THE SIDE."
32 50 PRINT "WHAT DO YOU WANT YOUR
33 STARTING POSITION TO BE?"
34 55 POINT X,Y?
35 INPUT X,Y?
36 56 IF X>64 AND Y>0 THEN GOTO
37 57
38 58 GOTO 90
39 59 PRINT X,Y
40 60 PRINT "Y=Y+2"
41 61 INPUT Y
42 62 IF Y>42 AND Y<=0 THEN GOTO
43 63
44 64 GOTO 140
45 65 PRINT Y
46 66 PRINT Y+2
47 67 CLS
48 68 GOTO 9999
49 69 LET RS=R$+KEYS
50 70 IF RS="A" AND RS="S" THEN G
51 71 2000
52 72 IF RS="T" THEN RAND USA 185
53 73

```

## Sketch pad

```

1620 IF R5=0 THEN GOTO 5000
1630 IF R5=2 THEN GOTO 5000
1640 IF R5=-1 THEN GOTO 3000
1650 GOTO 1000
1660 REM PLDT NEW X,Y
1670 LET C=CODE(X)
1680 LET X=X+1(C4B5)+(X-531)-(C-
1690 1)*X
1700 LET Y=Y+1(C471)+(Y-131)-(C-
1710 1)*Y
1720 GOTO 1000
1730 REM THE ROUTINE
1740 PRINT AT 21,0 POINT1, HOW
1750 SPACES ALONG 4
1760 INPUT A
1770 IF A>0 AND A<4 THEN GOTO
1780 3000
1790 GOTO 3220
1800 PRINT AT 21,0 POINT1, HOW
1810 SPACES UP TO
1820 INPUT B
1830 IF B>0 AND B<42 THEN GOTO
1840 3000
1850 GOTO 3000
1860 PRINT AT 21,0 POINT2, HOW
1870 SPACES ALONG 4
1880 INPUT C
1890 IF C>0 AND C<164 THEN GOTO
1900 3110
1910 GOTO 3110
1920 PRINT AT 21,0 POINT2, HOW
1930 SPACES UP TO
1940 GOTO 3110

```

# Open Forum

## Square roots

by Ian Fletcher

Here are two suggestions for generating square roots on a Vic-20. Both first write the number T as  $E \cdot 10^k \cdot N$ , with N an integer and  $10^k > N > 1$ .

The first method then approximates  $\text{SQR}(N)$  by linear approximations using knowledge of square roots of  $(5 \cdot 10^k)$ ,  $(6 \cdot 10^k)$ ,  $(7 \cdot 10^k)$ ,  $(8 \cdot 10^k)$ ,  $(9 \cdot 10^k)$ , and  $(10 \cdot 10^k)$ . The second method approximates  $\text{SQR}(N)$  by using a quadratic obtained by using the square roots of  $(5 \cdot 10^k)^2$ ,  $(7 \cdot 10^k)^2$ , and  $(10 \cdot 10^k)^2$ . Finally the approximation is completed by a Newton method.

## Fog

by Ian Fletcher

In this 5.75K program the idea is to get from one side of the gray fog to the other. However, there are a number of invisible objects which you must get past to reach the other side. You must also avoid a pursuing zombie and watch out for the mines. But do not have too long if you want out of time.

When the game starts you will receive instructions. The screen will go black for a few seconds and then the fog and a flying gauges will appear. You are represented by a '+' sign while the zombie appears as a 'Z'. If you find that you cannot move them you have hit a wall and will have to try a different direction.

REM statements show how the program is structured. Line 1 gives a 24 line screen. Putting all the instructions in one string enables them to be printed one character at a time.

Lines 2000 onward enable the game to start straight from loading. However, when SAVING you must type RUN 2000 instead of the normal SAVE. My high score is 26, if you do better than change line 285

```

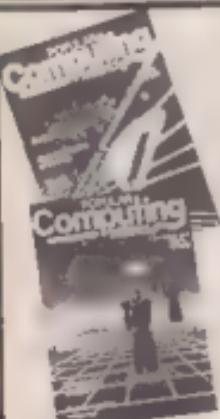
2000 REM 1280x1920 24 LINES
2010 LET X=100:LET Y=100:LET Z=100
2020 LET A=100:LET B=100:LET C=100
2030 LET D=100:LET E=100:LET F=100
2040 LET G=100:LET H=100:LET I=100
2050 LET J=100:LET K=100:LET L=100
2060 LET M=100:LET N=100:LET O=100
2070 LET P=100:LET Q=100:LET R=100
2080 LET S=100:LET T=100:LET U=100
2090 LET V=100:LET W=100:LET X=100
2100 LET Y=100:LET Z=100:LET A1=100
2110 LET B1=100:LET C1=100:LET D1=100
2120 LET E1=100:LET F1=100:LET G1=100
2130 LET H1=100:LET I1=100:LET J1=100
2140 LET K1=100:LET L1=100:LET M1=100
2150 LET N1=100:LET O1=100:LET P1=100
2160 LET Q1=100:LET R1=100:LET S1=100
2170 LET T1=100:LET U1=100:LET V1=100
2180 LET X1=100:LET Y1=100:LET Z1=100
2190 LET A2=100:LET B2=100:LET C2=100
2200 LET D2=100:LET E2=100:LET F2=100
2210 LET G2=100:LET H2=100:LET I2=100
2220 LET J2=100:LET K2=100:LET L2=100
2230 LET M2=100:LET N2=100:LET O2=100
2240 LET P2=100:LET Q2=100:LET R2=100
2250 LET S2=100:LET T2=100:LET U2=100
2260 LET V2=100:LET W2=100:LET X2=100
2270 LET Y2=100:LET Z2=100:LET A3=100
2280 LET B3=100:LET C3=100:LET D3=100
2290 LET E3=100:LET F3=100:LET G3=100
2300 LET H3=100:LET I3=100:LET J3=100
2310 LET K3=100:LET L3=100:LET M3=100
2320 LET N3=100:LET O3=100:LET P3=100
2330 LET Q3=100:LET R3=100:LET S3=100
2340 LET T3=100:LET U3=100:LET V3=100
2350 LET X3=100:LET Y3=100:LET Z3=100
2360 LET A4=100:LET B4=100:LET C4=100
2370 LET D4=100:LET E4=100:LET F4=100
2380 LET G4=100:LET H4=100:LET I4=100
2390 LET J4=100:LET K4=100:LET L4=100
2400 LET M4=100:LET N4=100:LET O4=100
2410 LET P4=100:LET Q4=100:LET R4=100
2420 LET S4=100:LET T4=100:LET U4=100
2430 LET V4=100:LET W4=100:LET X4=100
2440 LET Y4=100:LET Z4=100:LET A5=100
2450 LET B5=100:LET C5=100:LET D5=100
2460 LET E5=100:LET F5=100:LET G5=100
2470 LET H5=100:LET I5=100:LET J5=100
2480 LET K5=100:LET L5=100:LET M5=100
2490 LET N5=100:LET O5=100:LET P5=100
2500 LET Q5=100:LET R5=100:LET S5=100
2510 LET T5=100:LET U5=100:LET V5=100
2520 LET X5=100:LET Y5=100:LET Z5=100
2530 LET A6=100:LET B6=100:LET C6=100
2540 LET D6=100:LET E6=100:LET F6=100
2550 LET G6=100:LET H6=100:LET I6=100
2560 LET J6=100:LET K6=100:LET L6=100
2570 LET M6=100:LET N6=100:LET O6=100
2580 LET P6=100:LET Q6=100:LET R6=100
2590 LET S6=100:LET T6=100:LET U6=100
2600 LET V6=100:LET W6=100:LET X6=100
2610 LET Y6=100:LET Z6=100:LET A7=100
2620 LET B7=100:LET C7=100:LET D7=100
2630 LET E7=100:LET F7=100:LET G7=100
2640 LET H7=100:LET I7=100:LET J7=100
2650 LET K7=100:LET L7=100:LET M7=100
2660 LET N7=100:LET O7=100:LET P7=100
2670 LET Q7=100:LET R7=100:LET S7=100
2680 LET T7=100:LET U7=100:LET V7=100
2690 LET X7=100:LET Y7=100:LET Z7=100
2700 LET A8=100:LET B8=100:LET C8=100
2710 LET D8=100:LET E8=100:LET F8=100
2720 LET G8=100:LET H8=100:LET I8=100
2730 LET J8=100:LET K8=100:LET L8=100
2740 LET M8=100:LET N8=100:LET O8=100
2750 LET P8=100:LET Q8=100:LET R8=100
2760 LET S8=100:LET T8=100:LET U8=100
2770 LET V8=100:LET W8=100:LET X8=100
2780 LET Y8=100:LET Z8=100:LET A9=100
2790 LET B9=100:LET C9=100:LET D9=100
2800 LET E9=100:LET F9=100:LET G9=100
2810 LET H9=100:LET I9=100:LET J9=100
2820 LET K9=100:LET L9=100:LET M9=100
2830 LET N9=100:LET O9=100:LET P9=100
2840 LET Q9=100:LET R9=100:LET S9=100
2850 LET T9=100:LET U9=100:LET V9=100
2860 LET X9=100:LET Y9=100:LET Z9=100
2870 LET A10=100:LET B10=100:LET C10=100
2880 LET D10=100:LET E10=100:LET F10=100
2890 LET G10=100:LET H10=100:LET I10=100
2900 LET J10=100:LET K10=100:LET L10=100
2910 LET M10=100:LET N10=100:LET O10=100
2920 LET P10=100:LET Q10=100:LET R10=100
2930 LET S10=100:LET T10=100:LET U10=100
2940 LET V10=100:LET W10=100:LET X10=100
2950 LET Y10=100:LET Z10=100:LET A11=100
2960 LET B11=100:LET C11=100:LET D11=100
2970 LET E11=100:LET F11=100:LET G11=100
2980 LET H11=100:LET I11=100:LET J11=100
2990 LET K11=100:LET L11=100:LET M11=100
3000 LET N11=100:LET O11=100:LET P11=100
3010 LET Q11=100:LET R11=100:LET S11=100
3020 LET T11=100:LET U11=100:LET V11=100
3030 LET X11=100:LET Y11=100:LET Z11=100
3040 LET A12=100:LET B12=100:LET C12=100
3050 LET D12=100:LET E12=100:LET F12=100
3060 LET G12=100:LET H12=100:LET I12=100
3070 LET J12=100:LET K12=100:LET L12=100
3080 LET M12=100:LET N12=100:LET O12=100
3090 LET P12=100:LET Q12=100:LET R12=100
3100 LET S12=100:LET T12=100:LET U12=100
3110 LET V12=100:LET W12=100:LET X12=100
3120 LET Y12=100:LET Z12=100:LET A13=100
3130 LET B13=100:LET C13=100:LET D13=100
3140 LET E13=100:LET F13=100:LET G13=100
3150 LET H13=100:LET I13=100:LET J13=100
3160 LET K13=100:LET L13=100:LET M13=100
3170 LET N13=100:LET O13=100:LET P13=100
3180 LET Q13=100:LET R13=100:LET S13=100
3190 LET T13=100:LET U13=100:LET V13=100
3200 LET X13=100:LET Y13=100:LET Z13=100
3210 LET A14=100:LET B14=100:LET C14=100
3220 LET D14=100:LET E14=100:LET F14=100
3230 LET G14=100:LET H14=100:LET I14=100
3240 LET J14=100:LET K14=100:LET L14=100
3250 LET M14=100:LET N14=100:LET O14=100
3260 LET P14=100:LET Q14=100:LET R14=100
3270 LET S14=100:LET T14=100:LET U14=100
3280 LET V14=100:LET W14=100:LET X14=100
3290 LET Y14=100:LET Z14=100:LET A15=100
3300 LET B15=100:LET C15=100:LET D15=100
3310 LET E15=100:LET F15=100:LET G15=100
3320 LET H15=100:LET I15=100:LET J15=100
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5390 LET Q39=100:LET R39=100:LET S39=100
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5750 LET X43=100:LET Y43=100:LET Z43=100
5760 LET A44=100:LET B44=100:LET C44=100
5770 LET D44=100:LET E44=100:LET F44=100
5780 LET G44=100:LET H44=100:LET I44=100
5790 LET J44=100:LET K44=100:LET L4
```

# Open Forum

```

282 LET Y=X-1:INKEY$=5:FOR X=1 TO 1000
283 IF X>100 THEN GOTO 400
284 IF Y>100 THEN GOTO 240
285 IF X=Y THEN LET Z=J+1
286 IF X>Y THEN LET Z=J+1
287 IF X<Y THEN LET Z=J+1
288 PRINT Z:IF X=Y THEN PRINT "LUCKY"
289 PRINT AT X,Y,":"
290 IF J>X AND X>Y THEN GOTO 47
291 GOTO 170
292 REM *****CODE*****
293 REM END OF CODE
294 REM *****CODE*****
295 REM IN THIS LINE YOU ARE
296 REM IN A MAZE WHICH IS FULL OF PO-
297 REM TENTS WHERE YOU ARE IN
298 REM PROJECTS GET OUT THE EXIT
299 REM IN DOING ALL THE CAR SIDE OUT DU-
300 REM ST GET OUT WHILE YOU RUN ON
301 REM TIME, THEN + ZOMBIE WALKS
302 REM TO GET OUT YOU MUST GO THROUGH
303 REM HALLS SLOWLY AND CR-
304 REM EATURE OF TH-
305 REM ELLY MINE
306 REM IN LUCKY LINE ARE -
307 REM UP
308 REM DOWN
309 REM LEFT
310 REM RIGHT
311 REM STOP
312 REM PRINT AT 21,1:UNLUCKY:OUT
313 REM GOTO 350
314 REM LET X=P
315 REM LET Y=Q
316 REM GOTO 370
317 REM PRINT AT 25,16:POGRM T-
318 REM LET J=1:IF X>Y THEN GOTO 350
319 REM LET Y=S:INKEY$=5
320 REM IF X>Y THEN GOTO 22
321 REM IF X<Y THEN GOTO 520
322 REM J=J+1
323 REM PRINT AT 21,1:HIT MINE:YOU
324 REM GOTO 350
325 REM END

```



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# Programming

## Knowing where the next byte is coming from

**Stephen Devine** explains how to squeeze programs into 1K by memory-saving techniques

ZX81 owners are often disappointed by the lack of memory on the basic machine. They often find themselves with programs which are just too long to fit within the available 1K. However, by using various memory saving techniques it is often possible to sufficiently shorten these programs so that they can be run at 1K.

Since the method of storing floating point numbers on the ZX81 uses six bytes for each number, considerable savings in memory can be obtained by replacing all of the numbers in a program (except the line numbers) by equivalent symbols. If the numbers 0 and 1 are replaced by NOT PI and SGN PI respectively then four bytes are saved each time.

For 8-bit single- or double-digit numbers the VAL function can be used. For example, VAL "4" saves two bytes since the digit 4 is stored as a string and not as a floating point number.

The CODE function can be used for even larger numbers, provided that there is a symbol in the character set which corresponds to the number to be replaced. For example, CODE 1F will replace the number 256.

If the same number is used repeatedly throughout a program, then it may be worthwhile assigning that number to a variable and at start-up time and using the variable each time the number is required. If the number 500 appears repeatedly in a program then it could first be assigned to a variable by, say, LET N = 500. Then statements such as LET X = X - 500 could be replaced by LET X = X + N saving two bytes each time.

Replacing all the literal numbers in a program will often save enough memory to enable the program to be run successfully, but if not, there are some further techniques which can be applied.

One method of saving memory is to reduce the memory requirements of conditional statements. For example, a statement of the form: IF A = X THEN LET P = P + 1 can be replaced by LET P = P + (A=X) with a saving of six bytes. Much used statements in arcade type games are those using the INKEY function such as 10 IF INKEYS = 5 THEN LET A = A + 1 20 IF INKEYS = 5 THEN LET A = A - 1

which might be used to move an object

There are more ways to find extra bytes than the addition of a RAM pack.



back and forth across the screen. These can be replaced by the single statement: 10 LET A = X : INKEYS = B : IF INKEYS = "5" saving 20 bytes each time. If the variable is to be incremented or decremented by more than one then the parentheses can be multiplied by the required number, for example:

```
10 IF INKEYS = "5" THEN LET Y = Y + 1  
20 IF INKEYS = "5" THEN LET Y = Y - 1  
can be replaced by  
10 LET Y = Y + VAL "2"  
20 LET Y = Y - VAL "2"
```

saving thirteen bytes.

Many PRINT statements can also be modified to consume less memory. For example, when printing instructions many words can often be replaced by single word keywords.

### Single stroke keywords

Take the statement PRINT "ENTER YOUR NAME". This can be replaced by the equivalent PRINT "INPUT YOUR NAME" where INPUT is entered as a single-stroke keyword. This saves six bytes, since the spaces before and after the word INPUT are free. Many more keywords such as IF, OR, TO, AND and THEN and others can also be used in this way. However, it enables certain words to be entered if it may be necessary to first enter THEN and edit it out afterwards.

When a test of concurrent lines is to be printed such as:

```
10 IF P1  
11 IF P2  
12 IF P3
```

it can be replaced by

10 IF P1

which, in this case, saves six bytes.

It should also be remembered that GOTO:, and GOSUB:, need not be assigned a literal numerical value, such as GOTO 100, but can be used with functions. For example the routine

```
10 IF X = 1 THEN GOTO 100  
20 IF X = 2 THEN GOTO 200  
30 IF X = 3 THEN GOTO 300
```

can be replaced by the single statement

10 GOTO 100+X

saving a massive 40 bytes.

By using some, or all, of the techniques outlined above and by experimenting with others you should find that there are a few short programs which cannot be squeezed into 1K. Even some larger ones, which would normally use up to 2K of memory can be effectively halved and run in 1K.

If a 16K RAM pack is added to the basic machine, the conservative use of memory should not be neglected. It makes for very efficient programming and even with 16K of memory there will still be some programs which are just that little bit too long.

# Spectrum

In this new slot various contributors explore different aspects of the ZX Spectrum.

## Making these graph-ics is easy as pie!

**Nick Hampshire**, explains how to put different shapes into your circles.

Line 10: Location of centre of disc on screen.

Line 28: Radius of disc.

Line 38: Increment of radius between circles.

The simple way to draw a disc is to use the CIRCLE command in a program loop. This varies the radius from the centre of the disc to the outside perimeter, thereby drawing a set of concentric circles. The distance between each concentric circle can be varied by changing the step value in the radius increment loop.

This method will accurately draw a high resolution disc on the screen, but it has two drawbacks: (a) the spacing between the dots in each concentric circle cannot be varied, and (b) it is impossible to draw a segment of a disc.

These drawbacks are overcome by the following program:

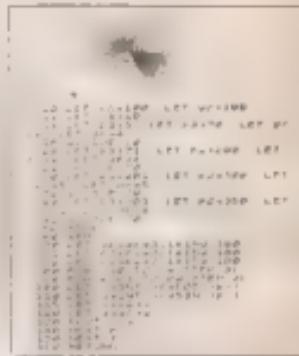


10 INPUT#1,x0,y0  
20 INPUT#1,r  
30 INPUT#1,dP  
40 FOR r=0 TO r0 STEP dP  
50 CIRCLE x0,y0,r  
60 NEXT r

In this program lines 70 to 100 draw a circle on the screen at centre co-ordinates x0, y0, of a radius r0 and with a spacing between the dots of dP degrees. It should be noted that line 70 converts the degree angle dot increment into radians.

70 dP=radians(3.14159/180)  
80 BEGINangle

A variation of the previous program can be used to draw this segment of a disc. This requires two new parameters — the beginning angle of the segment and the end angle.



By using a combination of different segments, each with different dot densities, you can draw pie charts — a useful way of graphically representing data. The following program draws such a chart:

10 SET centre to screen co-ordinates x0+100, y0+100  
12 SET radius = full radius/40  
14-50 The data code for each segment. This is in the following form: -21= start angle, 120= end angle, three= determine the segments in angular 0000, 00 and 01, determine the dot 1040/1000 and therefore the density of the wedge.  
79-129 the sub-routines to draw a disc segment.



```
10 INPUT x0,y0  
20 INPUT r2  
30 INPUT dP  
40 FOR r=x0 TO r2 STEP dP  
50 CIRCLE x0,y0,r  
60 NEXT r
```

```
40 INPUT x0,y0  
50 INPUT r2  
60 INPUT dP  
70 INPUT r1  
80 FOR r=r1 TO r2 STEP dP  
90 CIRCLE x0,y0,r  
100 LET x=r*cos(180+dP)  
110 LET y=r*sin(180+dP)  
120 LET z=r  
130 PLOT x,y,z  
140 NEXT r  
150 NEXT r
```



# Sound & vision



## Stringalonga maximum trickery!

The three routines listed will enable you to manipulate a string array containing a full screen image of 704 bytes. First of all however, you need to put your string together. This can be done as follows. First set RAMTOP with the following three commands:

```
PORG 16384  
POKE 16389 125  
NEW
```

Now LOAD any program which produces an interesting screen image. Then add the following subroutine to that program. I have numbered the subroutine to start at \$C000, but you can use any convenient numbers.

```
0000 LET D=1 : PEEK 16388+258=PEEK 16397  
0010 FOR I=2 TO 102  
0020 POKE 220008+PEEK I,D : INT 1581  
0030 NEXT I  
0035 RETURN
```

You will also need to add some method of calling that subroutine when a suitable image is displayed on the screen. RUN the program and, when you have a good image, call the subroutine when it has run

its course. STOP the program and clear it by pressing NEW. Provided you do not turn off the power, the image will remain in store over RAMTOP.

The next step is to call this image into a literal string:

```
10 LET AS=  
20 FOR I=32000 TO 32959  
30 LET AS=AS+CHR(PEEK I)  
40 NEXT I  
50 PRINT AS
```

RUN this program and the image will be displayed. From now on, it is important not to use CLEAR or RUN, as these will lose AS. Press newline, and write the following program over the existing one (note that the contents of XS must be the graphics characters represented on the keys in line 20):

```
As=LEN AS  
12 LET XS=AS  
20 FOR I=1 TO 255  
30 LET XS=XS+CHR(PEEK 16388+258*PEEK I+16397)  
40 LET X=PEEK 16388+258*PEEK I+16397  
50 LET Y=PEEK 16388+258*PEEK I+16397  
60 LET Z=PEEK 16388+258*PEEK I+16397  
70 LET A=LEN XS  
80 LET B=LEN XS-X+1 : LET C=LEN XS-Y+1 : LET D=LEN XS-Z+1  
90 LET E=LEN XS-1 : LET F=LEN XS-2 : LET G=LEN XS-3 : LET H=LEN XS-4  
100 LET I=LEN XS-5 : LET J=LEN XS-6 : LET K=LEN XS-7 : LET L=LEN XS-8  
110 LET M=LEN XS-9 : LET N=LEN XS-10 : LET O=LEN XS-11 : LET P=LEN XS-12 : LET Q=LEN XS-13 : LET R=LEN XS-14 : LET S=LEN XS-15 : LET T=LEN XS-16 : LET U=LEN XS-17 : LET V=LEN XS-18 : LET W=LEN XS-19 : LET X=LEN XS-20 : LET Y=LEN XS-21 : LET Z=LEN XS-22 : LET A=LEN XS-23 : LET B=LEN XS-24 : LET C=LEN XS-25 : LET D=LEN XS-26 : LET E=LEN XS-27 : LET F=LEN XS-28 : LET G=LEN XS-29 : LET H=LEN XS-30 : LET I=LEN XS-31 : LET J=LEN XS-32 : LET K=LEN XS-33 : LET L=LEN XS-34 : LET M=LEN XS-35 : LET N=LEN XS-36 : LET O=LEN XS-37 : LET P=LEN XS-38 : LET Q=LEN XS-39 : LET R=LEN XS-40 : LET S=LEN XS-41 : LET T=LEN XS-42 : LET U=LEN XS-43 : LET V=LEN XS-44 : LET W=LEN XS-45 : LET X=LEN XS-46 : LET Y=LEN XS-47 : LET Z=LEN XS-48 : LET A=LEN XS-49 : LET B=LEN XS-50 : LET C=LEN XS-51 : LET D=LEN XS-52 : LET E=LEN XS-53 : LET F=LEN XS-54 : LET G=LEN XS-55 : LET H=LEN XS-56 : LET I=LEN XS-57 : LET J=LEN XS-58 : LET K=LEN XS-59 : LET L=LEN XS-60 : LET M=LEN XS-61 : LET N=LEN XS-62 : LET O=LEN XS-63 : LET P=LEN XS-64 : LET Q=LEN XS-65 : LET R=LEN XS-66 : LET S=LEN XS-67 : LET T=LEN XS-68 : LET U=LEN XS-69 : LET V=LEN XS-70 : LET W=LEN XS-71 : LET X=LEN XS-72 : LET Y=LEN XS-73 : LET Z=LEN XS-74 : LET A=LEN XS-75 : LET B=LEN XS-76 : LET C=LEN XS-77 : LET D=LEN XS-78 : LET E=LEN XS-79 : LET F=LEN XS-80 : LET G=LEN XS-81 : LET H=LEN XS-82 : LET I=LEN XS-83 : LET J=LEN XS-84 : LET K=LEN XS-85 : LET L=LEN XS-86 : LET M=LEN XS-87 : LET N=LEN XS-88 : LET O=LEN XS-89 : LET P=LEN XS-90 : LET Q=LEN XS-91 : LET R=LEN XS-92 : LET S=LEN XS-93 : LET T=LEN XS-94 : LET U=LEN XS-95 : LET V=LEN XS-96 : LET W=LEN XS-97 : LET X=LEN XS-98 : LET Y=LEN XS-99 : LET Z=LEN XS-100 : LET A=LEN XS-101 : LET B=LEN XS-102 : LET C=LEN XS-103 : LET D=LEN XS-104 : LET E=LEN XS-105 : LET F=LEN XS-106 : LET G=LEN XS-107 : LET H=LEN XS-108 : LET I=LEN XS-109 : LET J=LEN XS-110 : LET K=LEN XS-111 : LET L=LEN XS-112 : LET M=LEN XS-113 : LET N=LEN XS-114 : LET O=LEN XS-115 : LET P=LEN XS-116 : LET Q=LEN XS-117 : LET R=LEN XS-118 : LET S=LEN XS-119 : LET T=LEN XS-120 : LET U=LEN XS-121 : LET V=LEN XS-122 : LET W=LEN XS-123 : LET X=LEN XS-124 : LET Y=LEN XS-125 : LET Z=LEN XS-126 : LET A=LEN XS-127 : LET B=LEN XS-128 : LET C=LEN XS-129 : LET D=LEN XS-130 : LET E=LEN XS-131 : LET F=LEN XS-132 : LET G=LEN XS-133 : LET H=LEN XS-134 : LET I=LEN XS-135 : LET J=LEN XS-136 : LET K=LEN XS-137 : LET L=LEN XS-138 : LET M=LEN XS-139 : LET N=LEN XS-140 : LET O=LEN XS-141 : LET P=LEN XS-142 : LET Q=LEN XS-143 : LET R=LEN XS-144 : LET S=LEN XS-145 : LET T=LEN XS-146 : LET U=LEN XS-147 : LET V=LEN XS-148 : LET W=LEN XS-149 : LET X=LEN XS-150 : LET Y=LEN XS-151 : LET Z=LEN XS-152 : LET A=LEN XS-153 : LET B=LEN XS-154 : LET C=LEN XS-155 : LET D=LEN XS-156 : LET E=LEN XS-157 : LET F=LEN XS-158 : LET G=LEN XS-159 : LET H=LEN XS-160 : LET I=LEN XS-161 : LET J=LEN XS-162 : LET K=LEN XS-163 : LET L=LEN XS-164 : LET M=LEN XS-165 : LET N=LEN XS-166 : LET O=LEN XS-167 : LET P=LEN XS-168 : LET Q=LEN XS-169 : LET R=LEN XS-170 : LET 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```

# Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

## DON'T GIVE UP ON DEAR OLD AUNTY

R. Bass of Beech Road, Northwich, Cheshire, writes:

**Q** I recently received a BBC microcomputer. After trying the test Mr Reffis Smith gave in his article in your April 23 issue, I found that I have a BBC micro with the older operating system. Mr Smith said, "doubtless all will be put right", but what do owners of such machines need to do?

Also the "FX" function is inadequately defined, and apparently is not going to be put in the guide. Where can I find out about its uses? Even Peek & poke you give "bad command".

Lastly, when can we expect the impatiently-awaited full guide?

**A** BBC micro owners need not resist the temptation to give up in despair. The full guide should cover all the points you raise in more detail than I can here.

A lot of pressure has been put on the BBC, and it now seems likely that the full guide will be ready for dispatch on June 11. I am afraid that I cannot offer you much more until the guide arrives.

## JUST MAKE A NEW GEAR RESOLUTION

A. D. Hussey of Huddersfield Avenue, Crayke, Sussex, writes:

**Q** In your review of the ZX Spectrum in the May 8 edition you said "... screen resolution of 32 x 24 is adequate ... although this can be enlarged under software control in normal teletext standard."

Please could you explain what this means. What software? When is it available? Does it mean that adequate resolution is made sharper by this process?

**A** Teletext standard is 40 characters per line as opposed to the 32 which the spectrum will use normally. As for the software mentioned no

one is doing quite sure what is meant by that.

There is an architecture within the ROM for maintaining a teletext compatible 40 x 24 screen display. But, strictly speaking, that is firmware. The op-level adaptor is at owning hardware.

So far we can only hazard two or three guesses. Either the PR boys who have been telling everyone about this software have in fact confused their terms, or the teletext architecture will be accessed by an as yet unrevealed machine code routine. On reflection, I think that I immediately favour the first option.

As for making the resolution sharper, I doubt it. With the extra characters per line you are trying to get more, not less, into the same space. Nevertheless, indications are that the screen resolution will still be sufficiently good enough for this not to cause any problems.

## THESE'S LIFE IN THE OLD DOG YET

David Paine of Vartone Road, Prinstow, Devon, writes:

**Q** As an avid fan of the ZX81 I am very interested in its long life on the computer market. But, after reading your review of the ZX Spectrum, I am not sure whether the ZX81 will still be made after the Spectrum becomes available. Please could you tell me what will happen in the ZX81?

**A** To date, approximately four hundred thousand ZX81s have been made. A few months ago Clive Sinclair signed a much publicised deal with the giant American company, Tandy, to make ZX81s under licence. Conservative estimates maintain that, as a result of this deal, the ZX81 will become the world's first million selling computer by the end of the year.

In this country, even if half the ZX users decide to change it will take quite a few months for the new machines to be dispatched. Many of the

ZX81s will probably be sold second hand to first-time buyers, who quite naturally will be interested in ZX81 material.

So while this country will probably be the first to see the phasing out of the ZX81 there are just too many machines in use for this to be a quick process. I am sure that the ZX81 will enjoy considerable support for some time yet.

## AND THE MEMORIES STILL LINGER ON

John Bender of Felton Close, Orpington, Kent, writes:

**Q** I have a ZX81 with a 16K RAM pack and have written quite a long program. I know it is too long for the standard 8K machine but how can I find out how much actual memory it has taken?

**A** The program file starts at the address 16399. The last address of the program file is called D-FILE which is located at addresses 16395 and 16397. The difference between 16395 and the address of D-FILE is the number of bytes in a program if you enter as a direct command:

PRINT PEAK 16396-16397

16397-16398

you will get the amount of bytes in your program. If you enter

PRINT PEAK 16396-256+PEAK

16397-16398

you will get the number of bytes occupied by the program, all the variables and the screen. The following command:

PRINT PEAK 16398-PEAK

16397-256

-PEAK 16397-PEAK 16413-50

will give you an idea of how many bytes you have left in which to work at a particular time.

## IT'S ALL A QUESTION OF COMPATIBILITY

Alasdair Crawford of Murray Drive, Stonehouse, Scotland, writes:

**Q** I have a BBC micro-computer model A. Having read your review of the ZX Spectrum I am still convinced that the BBC is the

best machine yet available. But I am very interested in the £50 ZX Microdrive. Can you please tell me if it would be possible to connect the Microdrive to the BBC Micro-computer?

**A** There is a general feeling that if the ZX Microdrive meets the quoted specifications, then it will be of far greater importance to the world of computing than the Spectrum. After all, it does seem to be something of a storage revolution.

It must however, be borne in mind that the Microdrive has only been seen once in public, and that very briefly at the launching of the ZX Spectrum. To my knowledge, no one has had so much as a close look at it yet let alone a chance to do a thorough benchtest to analyse its full potential.

While it is due to be launched about August, Sinclair Research and Launch dates do not always coincide. So, I do not think it will be readily available until the autumn at least.

Given that the ZX printer can now be interfaced with other computers, I am sure that the Microdrive will also benefit from a host of compatible interfaces. Even at an interface costing £100, you would still get more storage with a Microdrive for almost £20 less than the Vic disc drive.

If the microdrive is not bagged, and that must soft be quite a big if, then a feed will be on to make it compatible with other computers. But this is several months in the future. Perhaps an early letter to Father Christmas might not come amiss.

Send your questions to Peek & Poke, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.

# Competitions

## Puzzle No 10

Young David was playing with his pocket calculator the other day, when he discovered that if he multiplied 21 by 87 the answer, 1827, consisted of the same four digits, though differently arranged.

This set him thinking of how many other similar examples were possible, each having this property.

How many other sets of numbers are there? Remember that each set must consist of two two-digit numbers which, when multiplied together produce a four-digit number formed from the same numbers. In each case, all four digits should be different.

### Solution to Puzzle No 6

The simplest way of solving this problem is to generate the values for I N C H in sequence, using four FOR/NEXT loops. The process is simplified if we realise that the value of I N C H must be greater than the square root of 1000000 (the smallest product with at least eight digits). We can therefore commence the 'I' loop at the value 3. To put into the program extra lines to further define the minimum value of I N C H as 3162 would probably be more麻烦 than letting the program run from the starting value of 3000. The only point to be borne in mind is that these first few seven-digit numbers could cause an error condition in line 90 if the subroutine was defined as 5 TO 8. Consequently I have used the form 5 TO 9 which will permit both seven and eight digit numbers to be divided without error. Users of other forms of Basic will need to make their own adjustments.

It can only be equal to either 0, 1, 8, or 9 so lines 40 & 60 permit this.

10 FOR I = 3 TO 9

20 FOR N = 6 TO 9

```

30 FOR C = 8 TO 9
40 FOR H = 9 TO 8
50 IF H = 3 THEN LET N = 5
60 IF H = 7 THEN NEXT C
70 LET INCH = 1^1000 + N^100 + C^10 + H
80 LET P S = STRS (INCH ^ INCH)
90 IF VAL P $= 0 THEN PRINT INCH
100 NEXT H
110 NEXT C
120 NEXT N
130 NEXT I

```

Answer: INCH = 9276

### Winner of Puzzle No 6

The winner is Ian Black, Great Wymondley, Hertfordshire, who receives £10.

### Solution to Crossword No 8

**Across:** 8 Axis 9 Statement 10 Delius 11 Loop 13 Memory 14 Length 17 Gold 18 Targets 20 Dimension 21 Vial.  
**Down:** 1 Random 2 Waste my time 3 Octave 4 Value 5 Len 6 Men of Geneva 7 Stop 12 Present 15 Hustle 16 Basic 17 Gods 19 He.

### Winner of Crossword No 8

The winner is: B. Tunks, Chelmsford Hatch, London, who receives £10.

### Rules

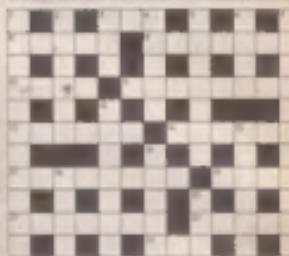
The winner of the puzzle will be the reader who, in the opinion of Popular Computing Weekly, has submitted the best solution. Preference will be shown to submissions which show how the entrant arrived at the correct answer, and to entries that indicate, in any way, how a micro might be applied.

The winner of the crossword will simply be the first name out of the hat.

The closing date for both the puzzle and the crossword is Monday, July 5.

Please mark your envelopes clearly with either CROSSWORD or PUZZLE.

## Crossword No 10



### ACROSS

- 1 Chaperone—examination of breeding water (3)
- 6 Runs a removal yard (3)
- 7 Men with a lot of hair (3)
- 8 Pleasant place to spend a daytrip (6)
- 11 A large farm-management tractor (not agricultural) (6)
- 12 Considered one-and-hundred-in (spare) (6)
- 14 Pig—ancestor has principles ingrained (3)
- 15 Fury (raged) for a dead-ancestor and lost his ship (3)
- 16 Short for a wanger (4)
- 17 Organism that can't move (3)
- 20 Organs that control regulating currents (3)
- 23 Teamship—removal from house and returned (3)

### DOWN

- 1 Chase for Data (code) (11)
- 2 Gonna (and increased directions) (3)
- 3 Admits he's off about (3)
- 4 Not (so)—true (happening) (3)
- 5 Very well-tempered (3)
- 6 Distracted, go outside—go outside (3)
- 7 Without a copy for workmates, efficiency compromised (3, 3, 4)
- 8 Men who change his true identity (3)
- 9 Fights (about) (3)
- 10 Men in... (not) (3)
- 11 Supply weapons for a massacre (3)

## CITIZEN PAIN

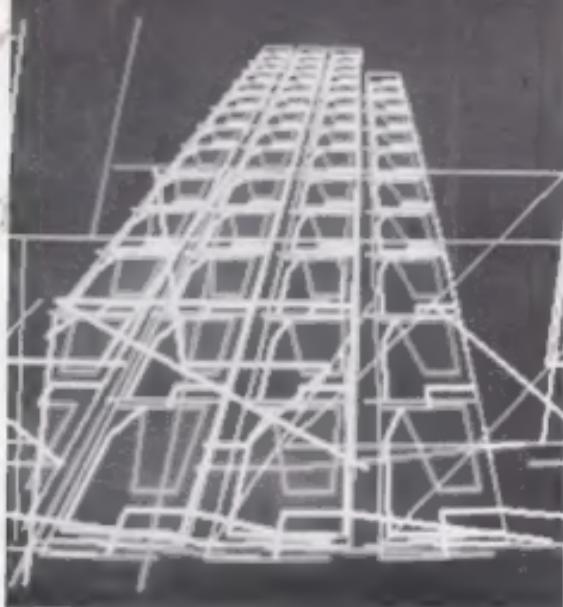
BY DAVID IRELAND and JAMES MACDONALD



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